Electronic Phonographs employing the
S & CC Unit 40 306 or 40 306a

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CHAPTER I Failures with the illumination, lamps and power system generally.

1. Symptoms: No light, phonograph not working at all.
   Cause: No power at wall socket; open primary circuit
   Possible faults: House fuse blown.
   Phonograph's fuse Si 1 blown, ref. to Chapter II
   Internal break in line cord or plug.
   Line switch off or defective.

2. Symptoms: Illumination does not light; phonograph otherwise works.
   Cause: Defective lamp circuit, refer to Chapter IX, Note 1.
   Possible faults: Lamps circuit plug not in light socket at amplifier.
   Lamp not properly seated in holder.
   Defective starter, defective lamp.

3. Symptoms: One or the other indicator lamp doesn't light up; Phonograph otherwise works.
   Cause: Lamp's circuit open.
   Possible faults: Lamp defective.
   Defective lamp socket.
   Defective plug BROWN or its wiring resp.
   Defect inside the computer, e.g. lamp driver transistor.

4. Symptoms: All indicator lamps remain dark, Phonograph otherwise works.
   Cause: Supply or common return of lamp's circuit open.
   Possible faults: Plug BROWN not set.
   Wire +30V broken (Plug BROWN, pole 6, white line).
   External short in lamps circuit has tripped T 5 (inside S&CC); this disables IC 14 to protect lamp driver transistors.
   Lamps of too high current rating.
   No 30VAC S&CC-supply via pole 1, plug RED;
   30V rectifier D7 defective (this, however, disables the coin acceptance also).
   coin inputs).

5. Symptoms: Digital display remains dark; Phonograph otherwise works.
   Cause: Display signal circuit interrupted.
   Possible faults: 14-pole D.I.L. plug not set or wrong way 'round.

6. Symptoms: Digital display shows non-sense figures; Phonograph otherwise works.
   Cause: Signal lines interchanged.
   Possible faults: 14-pole D.I.L. plug displaced (not in line with base).
   Computer defective, e.g. IC 23

7. Symptoms: Digital display shows incomplete figures (missing segment). The fault is the same with all three digits.
   Cause: Signal for one (or some) segments missing.
   Possible faults: One pin (or some) of 14-pole plug broken off.
   One wire (or some) of flat cable broken.
   Broken connection at display PC-board.
   Computer defective, e.g. IC 23

8. Symptoms: Digital display shows incomplete figures (missing segment). The fault, however, occurs with one of the three digits only.
   Cause: Segment signal doesn't reach this digit.
   Possible faults: Cracked conductor on display PC board.
   Defective display unit (3 identical one-digit units).

9. Symptoms: One of the digits of display completely off.
   Cause: Multiplex signal missing.
   Possible faults: Defective DIL plug or broken wire (A1, A2, A3).
   Computer defective (T6, T7, T8).
   Defective display element.

CHAPTER II Fuses. Which one controls what circuit?

The open holders of the L.T. fuses are capable to hold either 5x20 mm fuses of DIN 41571 standard or fuses of 6x30 mm size.

The holder of the H.T. primary fuse (mains) will hold one or the other type of fuse depending on the screw cap used.

The proper rating for the fuses in any of these holders is 3,15 Amps (or 3 to 4 Amps) SLOW BLOW. Slow Blow fuses of DIN standard bear the letter T, hence T 3,15 is the proper type to be used.

Only exception is for phonographs inside U.S., where a FAST BLOW fuse of 6,3 Amps (F 6,3 of 6x30 mm size) is rulled for the primary mains fuse. M-type (medium) fuses are not to be used with this phonograph.

1. Mains fuse: (in screw-cap holder in chassis pan apron) T 3,15 (F 6,3 in U.S.)
   Symptoms if blown: No illumination, phonograph completely dead.

2. Fuses Si 1 and Si 2: Loudspeaker fuses.
   Symptoms if blown: No sound on L.H. channel (Si 1) or R.H. channel; the reason for a blown fuse here might be a shorted power transistor.

3. Fuse Si 3: 30 V negative supply.
   Symptoms if blown: Amplifier distorting on both channels, green LED 1 not lit. With the changer, solenoids M3 (carrier latch) and M6 (A-side) not working.

4. Fuse Si 4: 30 V positive supply.
   Symptoms if blown: Amplifier silent. Gear motor not working.

5. Fuse Si 5: 12 V positive supply.
   Symptoms if blown: S&CC-computer dead (except red LED-M- still lighting up on coin insertion).

6. Fuse Si 6: 30 V AC supply.
   Symptoms if blown: Record carrier motor KM and turntable motor PM both not working.
   S&CC-computer not registering coins (red LED-M- not lighting up).

CHAPTER III Faults with the coin system. The phonograph, however, operates normally with credits established with the Free Credit Button (located above the coin switches).

The function of the coin system can be checked by observing the LED-light "M" at the computer, which should light up with every coin accepted as well as every time Free Credit Button is actuated.

1. Symptoms: Even good coins rejected as bad ones.
   Cause: Disabled slug rejector.
   Possible faults: Dirt, oil, an odd article in the rejector; rejector maladjusted.
   Binding reject rod assembly holding rejector gate open.
   Rejector or entire phonograph not level.

2. Symptoms: Wrong credits (or none) with one type of coin.
   Cause: Coin actuates the wrong coin switch. Coin pulse doesn't reach the Computer.
   Possible faults: Slug rejector not properly positioned, leading the coin to the wrong switch paddle or bypassing it. One line of the Coin Switches-to-Computer cable broken, disconnected at either end or wrongly set at Computer connector.
   Computer defective (IC 17 - IC 19, diodes D 14 - D 24).

3. Symptoms: Permanent credit, display shows 01 permanently, free selections.
   Cause: Jumper is set from 0 to F (free play).

4. Symptoms: Wrong credits, repetitive or at odd times, with credit above or below the programmed pricing.
   Cause: Programming mistake.
   Possible faults: BR jumper, accessible through hole for the mode switch, not in required state. It needs to be cut if boni beyond B4 should repeat B1...B4. If jumper is not cut, boni beyond B4 are all repetitions of B4.
   Programming jumper making poor contact (such can change pricing only after the unit had been switched off or the LT button had been actuated).

5. Symtoms: No credit although coins are properly accepted. Free Play, with GP jumper 0-F still possible.
   Cause: All coin input lines disabled, (LED M doesn't light up).
   Possible faults: Plug M not set.
   Common return of coin inputs (Plug M, pole 2, grey) open circuited.
   Supply 30 VAC missing (Plug RED, pole 1, brown line. In this case, however, all the indicator lamps fail too).
   Computer defective (e.g. Diode 1 interrupted).

6. Symptoms: No credit although coins are registered (LED-M- lights up). Even no free play credit with GP jumper set 0 to F.
   Cause: Computer out of operation.
   Possible faults: No power supplied to the computer, compare chapter II/5.
   Computer defective.

CHAPTER IV Faults with the selection system (Credit system does work).

1. Symptoms: No selections; numbers of actuated keys not displayed (but credit is).
   Cause: Open or shorted circuits in the keyboard wiring.
   Possible faults: Plug YELLOW displaced or not deep enough inserted.
   Key RESET permanently closed or shorted to ground (pole 12, brown, plug YELLOW).

2. Symptoms: No selections. After insertion of coins a number appears in the left hand (hundredst) digit but selection keys are disabled. With insertion of further coins the new credit is displayed properly.

   Cause: Permanent selection signal from that key who's number appears on the display.

   Possible faults: Jammed key permanently closed key contact.

   Wire of this shorted to ground.

3. Symptoms: No reponse from one key (or some).

   Cause: Open circuit with this key.

   Possible faults: Malfunction of this key's contact.

   Insufficient key travel. Broken wire with this key.

   Plug YELLOW not good enough seated.

   Computer defective with the affected input circuit (R65-R86 etc).

4. Symptoms: The record played is not the one selected. **The selection** was properly displayed, and the "RECORD PLAYING" display is the same.

   Cause: Improper counting of record carrier's position.

   Possible faults: Wrong adjustment of light control gates (ref. to Chapt. IX 3 A/B).
   Interference pulses counted as carrier pulses.
   Illumination light affecting the Z light gate; reflections at the edges of carrier base plate.

5. Symptoms: The record played is not the one selected. **The selection** was properly displayed but the "RECORD PLAYING" display is that of the record actually playing.

   Cause: Record carrier not latched instantly when the selected record was underneath the gripper arm.

   Possible faults: Record carrier latch delayed by mechanical friction.

   Record carrier latch too widely opening (latching too late).

   Light control gate Z retarded, ref. to Chapt. IX, 3 A/B for proper adjustm.)

6. Symptoms: The selected record will not be played. Instead the record carrier rotates continuosly, however, it stops if plug BLUE is pulled at the S&CC.

   Cause: Light gate signal Z (counting) or K (count start) or both missing.

   Possible faults: Lamp of light gate defective.

   Broken line in the wire to plug BLACK.

   See notes 3A/3B of Chapter IX.

CHAPTER V Repetitive play of records, selected or non-selected ones.

1. Symptoms: Repetitive play of one record with the record carrier not making a rotation between the repetitions. This continues even if plug BLUE is disconnected at the computer.

   Cause: Main cam motor not stopping at the end of the play cycle.

   Possible faults: Braking resistor R 10 (47 Ohms) at motor MM open.

   Wiper switch K 6 maladjusted.

2. Symptoms: Repetitive play of one record; discontinued after plug BLUE is pulled at the computer.

   Cause: Computer running out of program.

   Possible faults: Computer out of program routine, possibly caused by an interference pulse. (cut power to S&CC for a second, to initiate a restart of program.

   Computer defective.

3. Symptoms: Gripper moves a record permanently too and fro (without having the record actually played).

   Cause: Motor MM has a permanent ground return.

   Possible faults: Line Blue to pole 2 of plug BLUE shorted to ground.

   Wiper K6 shorted to ground.

   Computer defective (Relay 2 -M- permanently on; pull plug BLUE to test this. Try Service Program, key 7 and observe relay 2 through hole M).

CHAPTER VI Failures of the record changer after a properly completed selection.

1. Symptoms: Record carrier permanently rotating, even after plug BLUE is pulled. If a selection is made the carrier will be jammed when the gripper arm tries to grip a record.

   Cause: Carrier latch permanently open.

   Possible faults: Carrier latch or its solenoid jammed.

2. Symptoms: Record carrier permanently rotating. If a selection is made the record played is one placed about 10 compartments behind the selected one.

   Cause: Carrier latch solenoid permanently switched on.

   Possible faults: Grey line from M3 to pole 4 of plug BLUE shorted to ground

   (=fault does persist if plug BLUE is pulled).

   Relay 4 of S&CC jammed or permanently switched on (=carrier stops as soon as plug BLUE is pulled).

3. Symptoms: Carrier doesn't start after a properly completed selection. Carrier latch doesn't open.

   Cause: Circuit of the carrier latch solenoid not completed.

   Possible faults: DC supply -30V mising (Fujse Si 4).

   Coil of latch solenoid M3 open.

   Grey line from M3 to pole 4, or green line to pole 1 (relays common), plug BLUE, interrupted.

   Computer defective: go to Service Program, key 8, to check relay 4 -M3-. Test machine with a programming jumper from pole 1, green, to pole 4, grey. - Refer to Note 10, Chapter IX.

4. Symptoms: Record carrier doesn't rotate although the carrier latch opens after a selection.
   Cause: Carrier motor KM disabled.
   Possible faults: Micro switch m3 (at carrier latch) maladjusted or defective.
   Micro switch K8 (at gripper arm) maladjusted or gripper arm not fully in rest position (ref. to Chap. IX, 4).
   Defective motor KM, broken wiring.

5. Symptoms: A-side selections (odd numbers) are not played but the B-side of that record (even number following) is played instead.
   Cause: M6 shift solenoid and/or shift rod not working.
   Possible faults: M6 coil open, M6 circuit open. Shift rod binding, ref. to note 5, Chapter IX.
   Pole 3 (violet wire) of plug BLUE not making contact. To check this, pull plug BLUE and insert a jumper wire (programming jumper of the S&CC) from pole 1 (green) to pole 3 (violet); if M6 is now energized the fault then is inside the computer (e.g. relay 3 -M6- is not working.

6. Symptoms: Gripper arm does not move to take the record out of the carrier although the selected record was properly brought forward. After approx. 3 seconds the carrier moves to the next selection if such is due.
   Cause: Main cam motor MM doesn't start.
   Possible faults: Motor MM defective; resistor R 15 (18 Ohms) open; no DC +30 V to the motor (fuse Si 4); interruption with the blue line from amplifier to motor.
   Short within the motor or with capacitor C5 (in these cases R 15 gets rather hot!).
   Pull plug BLUE and set a jumper from pole 1 (green) to pole 2 (blue):If motor MM then runs, the fault is within the S&CC.
   Relay 2 -M- not working: go to Service Program and test with key 7.

7. Symptoms: Tone arm not moving to play record; selected record was properly brought to the turntable.
   Cause: Main cam motor MM switched off too early.
   Mechanical fault with the tone arm's tracking linkage.
   Possible faults: Wiper switch K6 defective or maladjusted (ref. to note 7, Chapter IX).
   Tone arm loose on shaft (Two worm screws M 3x4 mm).
   Linkage to tone arm control cam broken.

8. Symptoms: Turntable does not rotate; record to be played is properly brought forward.
   Cause: Turntable motor PM disabled, transmission disabled.
   Possible faults: Transmission O-ring from motor to turntable broken or fallen off.
   Pulley freewheeling on motor shaft (worm screw M 3x4 mm).
   Micro switch K8 not making contact after being released by record clamp.
   Defective turntable motor, open phase shift capacitor C 18.

9. Symptoms: Record on turntable returned to carrier before play has commenced.
   Cause: Main cam motor MM not resting when system in play position.
   Possible faults: Cancel button at amplifier jammed in "cancel" position, same with cancel button of a remote control; shorted remote control cable.
   Tone arm trip switch K3 defective (jammed in trip position).
   Resistor R 10 at motor MM open (ref. to note 4, Chapter IX).

CHAPTER VII Failures with the tone arm or the tone system.

1. Symptoms: First second of music missing because pick-up jumps off starting groove.
   Cause: Tone arm release lever and bushing assembly opening too late (ref. to Bild 21, p. 17, Service Manual).
   Possible faults: Tone arm release adjusting screw not far enough in.

2. Symptoms: Starting point of pick-up floating (varies from record to record).
   Cause: Tone arm release lever and bushing assembly opening too early or tone arm loose on shaft (refer to Bild 21, page 17, Service Manual).
   Possible faults: Tone arm release adjusting screw too far in. 2 worm screws M 3x4 not tight.

3. Symptoms: Record not completely played off - tone arm lifts off too early.
   Cause: Main cam motor restarted too early by tone arm trip switch K3.
   Possible faults: Tone arm trip switch K3 maladjusted. Retard (unscrew) adjusting screw to have play time extended (refer to "TE", Bild 21, page 17, Service Manual).

4. Symptoms: Record playing but no sound from the speakers.
   Cause: Defect in the system pick-up - amplifier - speakers.
   Possible faults: Pick-up connector or speaker plug not set at amplifier.
   Fuses Si 1 and Si 2 open (speaker fuses).
   Fuse Si 4 open (=+30 VDC missing, this, however, would also disable motor MM).
   Grey line (pole) of amplifier-to-changer cable broken off wiper K1 but shorted to ground.
   Amplifier defective (Transistor Tr2), ref. to Note 8, Chapter IX, for amplifier muting.

CHAPTER VIII Record not properly returning to carrier.

1. Symptoms: Gripper arm does not move to take record home.

   Cause: Main cam motor MM not starting.

   Possible faults: Tone arm trip switch K3 not making, maladjusted or open circuited.

   Refer to 6., Chapter VI, for faults if symptom could have developed while a record was playing.

2. Symptoms: Returned record not properly unclamped (not freed) in the carrier.

   Cause: Main cam motor MM switched off too early.

   Possible faults: Wiper switch K6 wrongly adjusted (compare with Chapter VI, Symptom 4 and refer to note 4, Chapter IX).

3. Symptoms: Record missing in compartment is found in other compartment or somewhere about the chassis.

   Cause: Gripper arm delayed and retarded by record binding with the turntable (refer to note 9, Chapter IX).

   Gripper arm generally moving too fast.

   Possible faults: Maladjusted turntable chassis linkage.

   Burr at the turntable pilot or at the record's centering hole.

   Series resistor R 15 (with motor MM) shorted.

CHAPTER IX

Note 1 The fluorescent lamp's circuit is based on 220 V. Except with certain "UL"-models, there are always 220 V at the lamp socket on the amplifier panel disregarding the actual voltage the phonograph is adjusted to and operating with. Lamp, starter and ballast is a matched group, never use replacements of other wattage! Check for a defective starter before you check for a defective lamp.

Note 2 Some actual low tension power readings (averages). Numbers left of/are effective (R.M.S.) values, read with a moving iron instrument. Numbers right of/are mean integrated values, read with a moving coil instrument.

	Changer & Computer idling	Record Carrier searching	Gripper Arm towards A-side title*	Gripper Arm towards B-side title*	Record playing at minimum volume
-30 V, read at fuse Si 3	33,0/31,5	29,7/27,5	31,0/29,5	33,0/30,5	33,0/28,5**
+30 V, read at fuse Si 4	33,0/31,5	30,5/29,5	31,5/29,0	32,0/30,0	33,0/28,5**
+12 V, read at fuse Si 5	10,0/12,5	9,5/11,5	10,0/12,0	10,0/12,0	10,0/12,5
30 V AC, read at fuse Si 6	31,5/29,5	29,5/27,5	31,0/29,5	31,0/29,5	31,5/29,5

All readings rounded for nearest full or half Volt.

* Readings made while gripper arm is on the way from carrier towards turntable.

** At full volume these readings are around 1 Volt lower.

Voltage readings directly at the S&C Computer against its chassis = ground.

Plug BROWN, pin 6 (brown) : +40 V DC = voltage to indicator lamps.
Plug RED , pin 1 (black) : 30 V AC = supply for computer
Plug RED , pin 2 (brown) : 11 V AC = supply for computer
Plug RED , pin 3 (red) : Zero V = ground & centre for pins 2 and 4
Plug RED , pin 4 (orange) : 11 V AC = supply for computer

Note 3 A: A selected record can properly be located only as long as the light gate controls are working properly. The counting pulses can be checked easily by observing the LED indicator Z which has to light up rhythmically when the carrier is rotating (manually unlock the carrier latch for a check). LED Z is dark whenever the carrier is at a standstill but has to light up as soon as a tooth tip of the carrier's base plate has passed the carrier latch's front edge for about 1-2 Millimetres. For a check lift the carrier off its friction drive wheel a little, unlock the carrier latch with the other hand and advance the carrier slowly manually.

Note 3 B: The locating pulse "101" can by checked with the LED indicator K. For a check bring the record preceding 101 beneath the gripper arm. Both K and Z then have to be dark. Don't mind if K is lit when the carrier rests with 101/102 beneath the gripper arm. then advance the carrier slowly (lift off the drive as explained with note 3A): K now has to light up by all means before Z but a very little advance in time is sufficient and K must still be alight when Z lights up. Which LED then goes outfirst doesn't matter but K by all means must be out before Z lights up again for the next record approaching the gripper arm. If K lights up behind Z, the computer cannot find its starting position and the record to be located will never be found,- the carrier then rotates permanently. If K is still alight when Z lights up for 103/4, the computer will consider this one as 101 and any record located will be that one "behind" the one actually selected.
The light gate assembly can be shifted for about 1 mm to find a proper timing.

Four K-signals in succession without a selection played in between causes a memory erase same as if the LT button is actuated. Therefor, rotation checks with the carrier should be terminated with an actuation of LT to prevent complaints raised by the first patron making a selection after the service, that he lost his money because his selection led to the fourth K-signal in succession!

Note 3 C: The lamp of the light gates is one of 24 Volts, 3 Watts. The actual burning voltage is reduced to about 12 Volts by a series resistor, or commencing with serial no. 6511 9514, by the 12 Volts regulator of the amplifier. The Phototransistors of the light gates can be checked with an Ohm-Meter at plug BLACK when disconnected. Read between poles 3 and 5 for the gate K and between poles 2 and 3 for gate Z. Results will be obtained only if poles 2 or 5 resp. are positive to 3, hence, interchange the poles for a test. With an open light gate the Ohms reading should be below " Kilo-Ohms and with the light broken it should be above 2 Meg-Ohms.

Note 4: Micro Switch K8 is actuated by the large record clamp of the gripper arm. If this switch is maladjusted or if the main cam and gear box stops before this record clamp is fully retracted, K8 will not be actuated. This disables the changer for the next search run and keeps the turntable running all the time.
The same situation, however, can be produced by a main cam and gear box overrunning the proper rest positions and stopping finally at a time when K8 is released again. Symptom 4 of Chapter VI, Trouble Shooting Chart, refers to the first situation, symptom 2 of Chapter VIII to the second.

To test, actuate K8 manually and run the changer through some play cycles. The record clamp has to actuate K8 before it reaches the most retracted position and has come to rest before it has passed this position; compare the adjustment instructions.

If the system overruns the most retracted position with a K6 switch of proper adjustment, check R 10, the braking resistor parallel to (and located at) the motor, it should not read more than 55 Ohms.

Note 5: The A-side solenoid M6 is in circuit for an A-side selection for about 3 seconds only, counted from the moment the carrier has stopped with the selected record beneath the gripper arm. Well within these 3 seconds the shift rod is locked in its A-side position by the holdout cam already; refer to pos. 20 and 26 of Fig. 16, Spare Parts List. The shift rod is free to be moved manually at the time the changer is in idling position.

Note 6: With a dead motor MM check the carbon brushes. Worn-out brushes are not likely before some years of service, however, a lack of contact pressure is feasible (binding brush holder). Watch for the insulation ring at one end of brush's tension spring; without this ring the motor is shorted and resistor R 15 will burn-out.

Note 7: A detail of circuit timing: Main cam motor MM is started by relay 2 of the computer for about 3 seconds. After thus the Transfer switch K6 should have made well within these three seconds. If K6 is maladjusted or defective, the main cam motor will stop in this moment, that is when the gripper arm is about half way between the record carrier and the turntable.

Note 8: The amplifier muting is by an electronic circuit gouverned by transistor Tr 2, and controlled by switch K1 via the grey line, pole 8, amplifier-to-changer cable. The amplifier is mute as long as this line is grounded, hence, the amplifier works outside the phonograph without any need of unmuting.

Note 9: The gripper arm is linked with the cam & gear shaft by a two-way spring clutch. If the record somehow is locked with the turntable and the arm is unable to take it off, the gear box still does advance and loads the clutch spring. Finally, the spring at a certain tension will free the record and then the arm flips to catch up. The record then is thrown about and may land in a wrong compartment or anywhere.

A maladjusted turntable chassis linkage may force the turntable too far to the right, thus "pincing" the record between the turntable pilot and the arm's upper clamp, especially if this is positioned deeper than the plane of the record. Such a situation may lock the system turntable (at pilot) -record- gripper arm.

With a main cam & gear unit generally moving too fast, the arm may run the returning record into the neighbour compartment or even loose it. A complete gear cycle normally takes about 12 seconds, never permit times shorter than 10 seconds. To check time, make a selection and hold the cancel button (amplifier) down all the time the arm moves. Time is counted from the moment the record carrier stops till the homed record is unclamped and micro switch K8 is actuated.

If there is a second record in one compartment and the original record is selected, there is a 50 % chance that the wrong one is played; the service call to be expected in such a case will be likely one of a "wrong selection".

The gripper arm when taking two records may loose the one of the smaller diameter and that may be the original one. This counts for the strange situation that a record is found laying about with another one found in that record's compartment; - a remote chance anyhow.

Note 10: Transistor T 22 pulls its collector to L as soon as the negative supply of the changer appears at the switch of relay 4 thus indicating that the record just been played is now back in the carrier. If this circuit is defective, the computer doesn't sense this but "thinks" the record is still playing. Hence it will not start a new search run although it has accepted coins and selections properly.

For a start short the collector of T 22 to ground momentarily. An external test can be made via the Servie Program, key no. 9. Typical for this fault is that a selection accepted will be played after the S&CC was switched off for a second or two.